

1.1 Radio Astronomy

1.1.1 Maintenance and Calibration

- Performed boresight TDN block (APCOffsets) for X and K bands with DSS-63 antenna to compare precision tracking performance of the 70m antennas in the DSN (ATOT on DOY 274).
- Temporary installation of Phase Calibration Signal equipment on DSS-54 antenna to give support to JPL RFC projects in X-band. This installation was supported by RF and TTC MDSCC groups.
- In preparation for VLBI engineering test with DSS-54 antenna, performed several Mark 5 recording tests at 1024Mbps (chk1024 procedure). Found that results using the formatter buffer are not valid. High speed recording should be performed connecting the MarkIV formatter directly to the Mark5 recorder.
- Performed additional Q-band observing tests. Performance for 2MHz video converters bandwidth is correct, but found spikes for 16MHz bandwidth (ATOT on DOYs 261 and 273). Problem under investigation.
- Collaboration in the DSS-65 ZDD calibration (DOY 270).

1.1.2 Research and Development

Robledo participated in the first 1024Mbps JPL VLBI test (DSS-54 and DSS-baseline).

Solved binding problems between Python and Gildas astronomical package at the Radio Astronomy Controller Linux PC (RAC60B) to support Host Country spectroscopy observations in K and Q bands.

1.1.3 Radio Astronomy meetings

Esther Moll attended the EVN Technical and Operations Group meeting, held in Bologna, Italy, on September 22nd. Robledo presented a station report. Official minutes will be published at:

http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togmins/togmins.html

1.1.4 Observations

1.1.4.1 Host Country Spectroscopy

During this month spectroscopy observations with DSS-63 antenna were carried out using the SPB500 spectrometer and the MarkIV data acquisition terminal. Following Host Country projects were performed using DSS-63 antenna:

- **D63-S01:** study of CCS molecule (22.334 GHz) extended emission in young low-mass proto-stars. The CCS molecule is abundant in molecular clouds during the first stages of star formation. We plan to make maps of its emission in several

start-forming regions, to study their physical conditions and chemical processes in the cloud.

- **D63-S02:** search for water maser emission toward optically obscured planetary nebulae. This project will allow testing the prediction that the precursors of planetary nebulae (PNe) might be optically obscured post-AGB stars with water fountains.
- **D63-S03:** Water maser monitoring in selected low-mass star-forming regions. The detection of the maser with DSS-63 will allow to request an exploratory time to the Very Large Array, and determine their position. The exact position of the water maser emission is needed to study the nature of the different young stellar objects in the region.
- **D63-S09:** Target of opportunity (TO): confirmation of a tentative detection of ammonia (NH₃) emission towards a very young and cold brown dwarf.

DOY	minutes scheduled	minutes used	Percent good data	Activity	comments
249	455	365	80	“GBRA Host Country D63-S02/S03”	OK
257	450	350	70	“GBRA Host Country D63-S01/S02”	OK
263	270	180	100	“GBRA Host Country D63-S03/S09”	OK
267	315	315	100	“GBRA Host Country D63-S02/S03”	OK

1.1.4.2 Interferometry

MDSCC participated in 4 Very Long Baseline Interferometric (VLBI) observations (1665 min in total):

- RFC Clock Synchronization on DSS-65 (2 observations; 480 min): For both observations 100% data collected; performance of the system nominal.
- RFC Catalog X/Ka on DSS-54 (1 observation; 1125 min): DSS-54 antenna stopped in EL and AZ in repetitive occasions (DR#M105059), 9 sources were impacted (3% data lost). X-band phase calibration tones were injected.
- VLBI ENG TEST on DSS-54 (1 observation; 60 min): First 1024 Mbps recording for RFC JPL project in X/Ka bands. 100% data collected; performance of the system nominal.